



REVIEW ON DESIGN AND DEVELOPMENT OF VEHICLE MOVEMENT BASED STREET LIGHT

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ABSTRACT

Smart Street light is an automated system which automates the street. The main aim of Smart Street light is to reduce the power consumption when there are no vehicle movements on the road. The Smart street light will glow with high intensity when there are vehicles on the road otherwise the lights will remain OFF. With advancement of technology, things are becoming simpler and easier for everyone in the world today. Automation is the use of control systems and information technologies to reduce the need for human work in the production of goods and services. In the scope of industrialization, automation is a step beyond mechanization, whereas mechanization provided human operators with machinery to assist the users with the muscular requirements of work, automation greatly decreases the need for human sensory and mental requirements as well. Automation plays an increasingly important role in the world economy and in daily experience. Automatic systems are being preferred over manual system. The research work shows automatic control of streetlights as a result of which power is saved to an extent. The Smart street light provides a solution for energy saving which is achieved by sensing an approaching vehicle using the IR sensors and then switching ON a block of street lights ahead of the vehicle with high intensity. As the vehicle passes by, the trailing lights turn OFF automatically. Thus, we save a lot of energy. So when there are no vehicles on the highway, then all the lights will remain OFF.

Keywords: energy saving, new technology, smart street light.

I. INTRODUCTION

Automation plays an increasingly very important role in the world economy and in daily life. Automatic systems are being preferred over any kind of manual system. We can also call it an –SMART STREET LIGHT SENSING|. Intelligent light sensing refers to public street lighting that adapts to movement by pedestrians, cyclists and cars. Intelligent street lighting also referred to as adaptive street lighting, remains OFF when no activity is detected, but brightens when movement is detected. This type of lighting is different from traditional, stationary and illumination, or dimmable street lighting that dims at predetermined times. The research work shows automatic control of streetlights as a result of which power is saved to some extent. In the scope of industrialization, automation is a step beyond mechanization. Whereas mechanization provided human operators with machinery to assist the users with muscular requirements of work, automation greatly decreases the need for human sensory and mental requirements as well. Basically, street lighting is one of the

important parts. Therefore, the street lamps are relatively simple but with the development of urbanization, the number of streets increases rapidly with high traffic density. There are several factors need to be considered in order to design a good street lighting system such as night-time safety for community members and road users, provide public lighting at cost effective, the reduction of crime and minimizing its effect on the environment. At the beginning, street lamps were controlled by manual control where a control switch is set in each of the street lamps which is called the first generation of the original street light. After that, another method that has been used was optical control method done using high pressure sodium lamp in their system. Nowadays, it is seen that the method is widely used in the country. The method operates by set up an optical control circuit; change the resistance by using of light sensitive Device to control street lamps light up automatically dusk and turn off automatically after dawn in the morning. Due to

the technological development nowadays, road lighting can be categorized according to the installation area and performance, for an example, lighting for traffic routes, lighting for subsidiary roads and lighting for urban center and public amenity areas. The WSN helps in improving the network sensing for street lighting. Meanwhile, street light system can be classified according to the type of lamps used such as incandescent light, mercury vapor light, metal halide light, high pressure sodium light, low pressure sodium light, fluorescent light, compact fluorescent light, induction light and LED light. Different type of light technology used in lighting design with their luminous efficiency, lamp service life and their considerations. The LED is considered a promising solution to modern street lighting system due to its behavior and advantages. Apart from that, the advantages of LED are likely to replace the traditional street lamps such as the incandescent lamp, fluorescent lamp and high-pressure Sodium Lamp in future but LED technology is an extremely difficult process that requires a combination of advanced production lines, top quality materials and high precision manufacturing process. Therefore, the research work highlights the energy efficient system of the street lights system using LED lamps with IR sensor interface for controlling and managing.

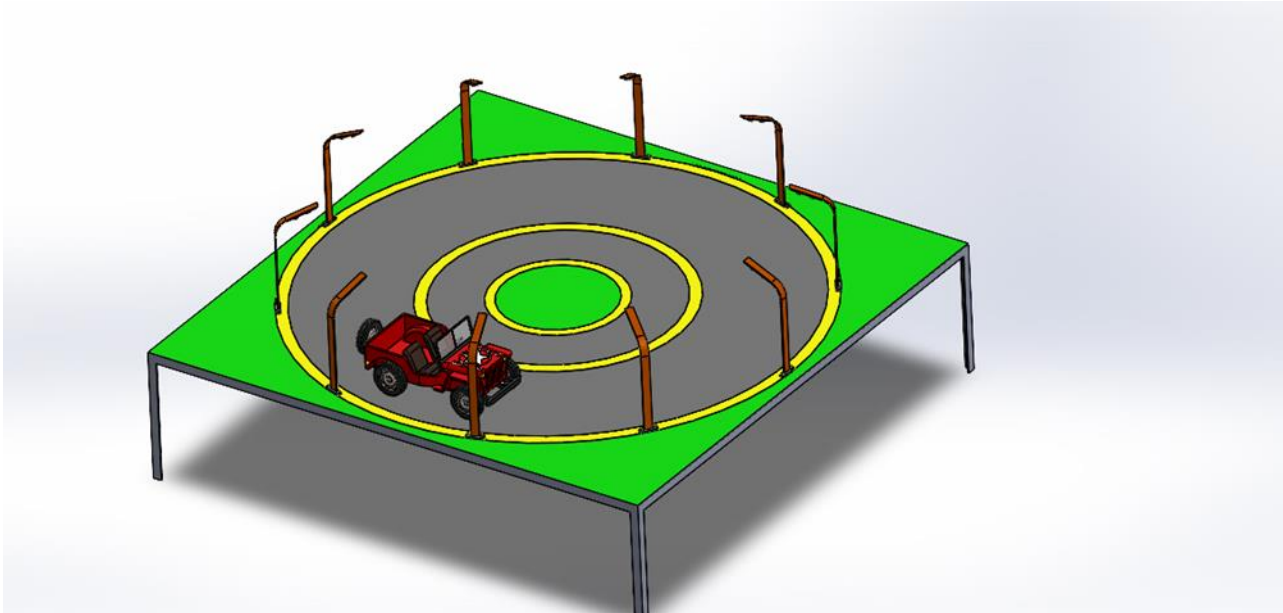


Figure 1 3D Model

II. METHODOLOGY

Street lights are controlled manually in older days. These days' automation of street lights has emerged. But one can observe that there is no need of high intensity in peak hours i.e. when there is no traffic and even in early mornings. By reducing the intensity in these times, energy can be saved to some extent. Technical devices and methods that are enhanced by technical progress will be necessary for the realization of adaptive lighting. The tender documentation states the goals of the E-street Project and the smart ways of their future implementation. It describes the system structure and the technical requirements towards its subsystems: roadside equipment, power system, local control system, central supervisory system and communication network. The main devices and elements required to implement an automatic street light system to control the intensity of street light with better quality assurance.

Working :

White Light Emitting Diode (LED) replaces HID lamps in street lighting system to include dimming feature. A microcontroller of 8051 families is used to control the intensity by developing pulse width modulated signals that drives a MOSFET to switch the LEDs accordingly to achieve desired operation.

In the present system, mostly the lighting up of highways is done through High Intensity Discharge lamps (HID), whose energy consumption is high. Its intensity cannot be controlled according to the requirement so there is a need to switch on to an alternative method of lighting system i.e., by using LEDs. This system is build to overcome the present day drawbacks of HID lamps.

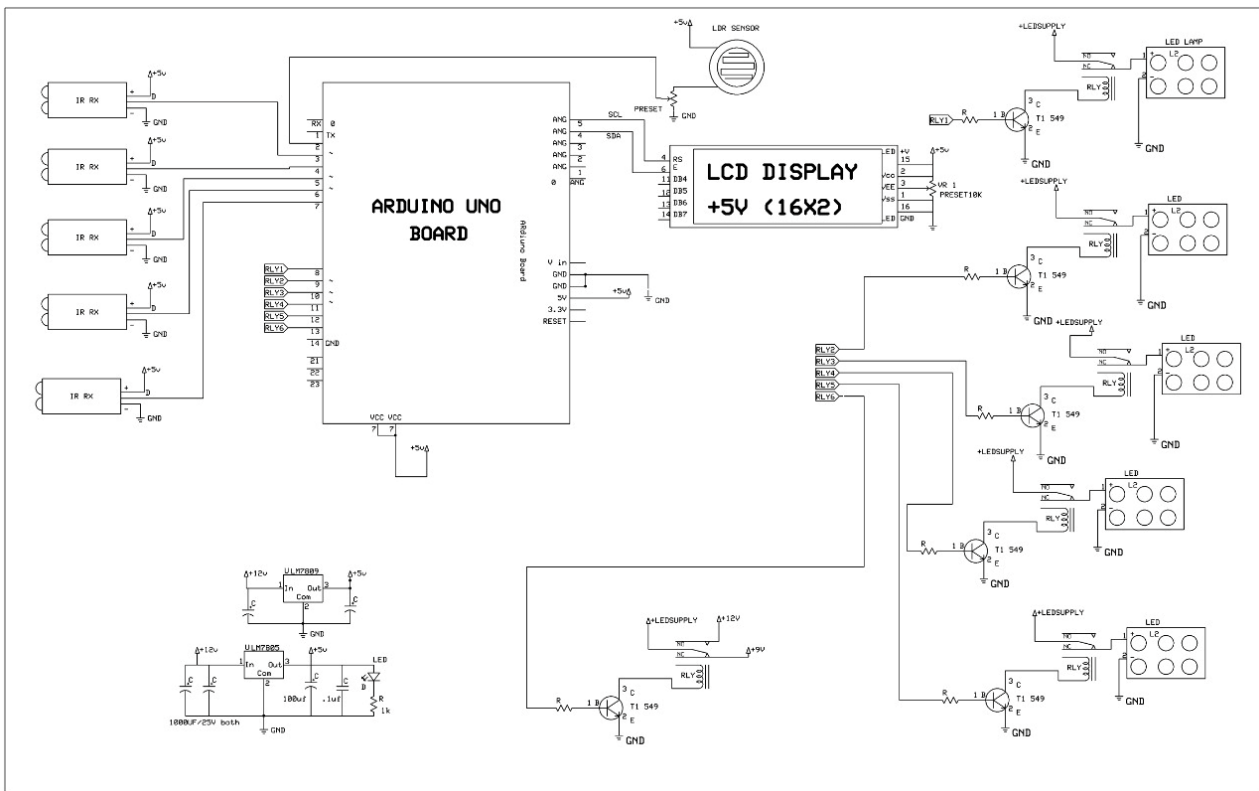
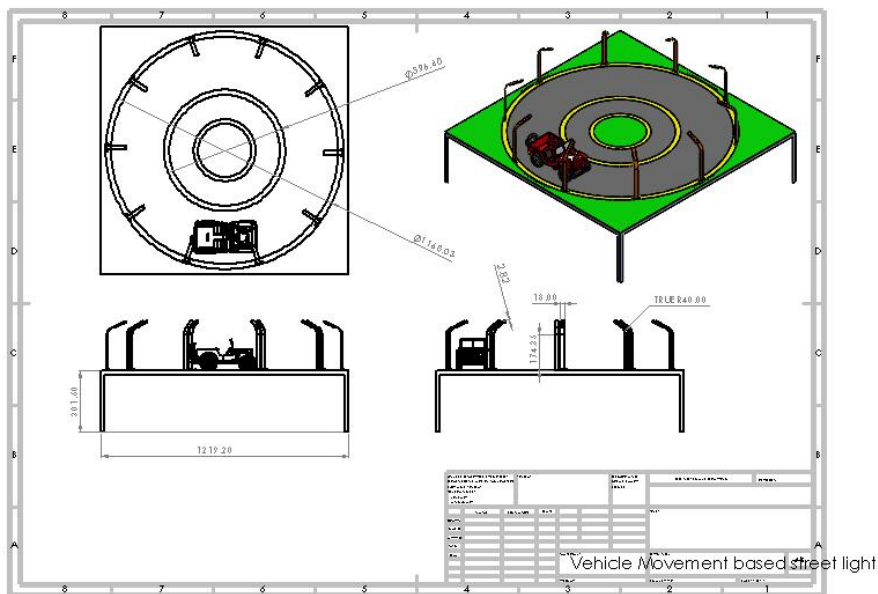


Figure 2 Circuit Diagram

This system demonstrates the usage of the LEDs (light emitting diodes) as the light source and its variable intensity control, according to the requirement. LED consumes less power and its life time is more, as compared to the conventional HID lamps. The more important and interesting feature is its intensity can be controlled according to the requirement during non- peak hours which is not feasible in HID lamps.

III. MODELING AND ANALYSIS

Model and Material which are used is presented in this section.



Fig(b): Drafting



Fig(c): Street Light Pole



Figure 1: 3D Road with Vehicle movement

IV. RESULTS AND DISCUSSION

The proposed streetlight automation system is a cost effective and the safest way to reduce power consumption. It helps us to get rid of today's world problems of manual switching and most importantly, primary cost and maintenance can be decreased easily. The LED consumes less energy with cool-white light emission and has a better life than high energy consuming lamps. Moving to the new & renewable energy sources, this system can be upgraded by replacing conventional LED modules with the solar-based LED modules. With these efficient reasons, this presented work has more advantages which can overcome the present limitations. Keep in mind that these long-term benefits; the starting cost would never be a problem because the return time of investment is very less. This system can be easily implemented in street lights, smart cities, home automation, agriculture field monitoring, timely automated lights, parking lights of hospitals, malls, airport, universities and industries etc.

V. CONCLUSION

A design scheme for controlling a streetlight system based on Arduino Uno microcontroller has been demonstrated, which can be programmed to react to events (based on night and object's detection as described above) and to cause corresponding actions. The proposed scheme provided with two operational modes, in which the first automated system is used to control the streetlights based on night (lights turn to DIM state) and object detection (lights turn to HIGH state). This proposed system is a cost effective, practical, eco- friendly and the safest way to save energy. It clearly tackles the two problems that world is facing today, saving of energy and also disposal of incandescent lamps

very efficiently. According to statistical data we can save more than 40% of electrical energy that is now consumed by the highways. Initial cost and maintenance can be the drawbacks of this system..

VI. REFERENCES

- [1] M Popa, C Cepisca. Energy consumption saving solutions based on intelligent street lighting control system. U P B Sci Bull, 73:297-308, 2011.
- [2] Schwab R N, Walton N E, Mounce J M and Rosenbaum M J. Synthesis of safety research related to traffic control and roadway elements. Volume 2, Chapter 12, Highway Lighting. Report No. FHWA-TS-82233. Federal Highway Administration, 1982.
- [3] Donald A Cleland. Street light monitoring and control. United States of America Patent US 8,290,710 B2, 16 October 2012.
- [4] D A Devi and A Kumar. Design and implementation of CPLD based solar power saving system for street lights and automatic traffic controller. International Journal of Scientific and Research Publications, 2(11):1-4, 2012.
- [5] Divya Guddeti. Design and implement of wireless sensor street light control and monitoring strategy along with GUI. IJITR, 78-81, 2016.
- [6] S Srivastava. Automatic street lights. Advance in Electronic and Electric Engineering, 3(5):539- 342, 2013.
- [7] Ahmed Sharique Anees, Anupriya, Ayushy Chowdhary, Shalini Dubey, Shweta Verma. Solar powered led streetlight with automatic intensity control. International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering, 3(6):32-36, 2013.
- [8] Arduino Based Auto Street Light Intensity Controller (PDF Download Available). Available https://www.researchgate.net/publication/316889619_Arduino_Based_Auto_Street_Light_Intensity_Controller [accessed Mar 13 2018].

